

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) An optical pickup apparatus which serves to focus the spots (M, E, F, G, H, I and J) of a plurality of light beams on a plurality of tracks of a recording medium (34) to simultaneously read a plurality of pieces of data recorded on said tracks, said apparatus comprising:

(a) objective spot forming means (30) for forming each spot (M, E, F, G, H, I, and J) of [[a]] said plurality of light beams entered via a collimator (28), on each track of [[a]] said recording medium (34);

(b) a series of adjacent photodetectors (52M, 52E, 52F, 52G, 52H, 52I, and 52J) each provided for each spot (M to J) for receiving reflected light of each spot (M to J), the reflected light having passed through said objective spot forming means (30), said collimator (28), and focus adjusting means (50) in this order; and

(c) a chassis (70) mounted with said collimator (28),

wherein said focus adjusting means (50) and said series of adjacent photodetectors (52M to 52J) are supported respectively by a focus adjusting means support member (72) and a photodetector support member (78) formed separately from said chassis (70), and the focus adjusting means support member (72) and the photodetector support member (78) are movable along a direction of an optical axis (66), and these members (72, 78) are fixed to said chassis at positions along an optical axis, the positions being visually confirmed that the reflected light of each spot (M to J) becomes incident upon a corresponding one of said photodetectors (52M to 52J).

2. (Original) An optical pickup apparatus according to claim 1, wherein the plurality of light beams are generated by making light from a light source (14) pass through a diffraction grating (20).

3. (Previously Presented) An optical pickup apparatus according to claim 1, wherein at least one of said series of adjacent photodetectors (52M to 52J) includes a plurality of light reception areas for divisionally receiving one light beam.

4. (Original) An optical pickup apparatus according to claim 1, wherein an optical axis (32) of the reflected light passing through the collimator is changed to an optical axis (66) toward said focus adjusting means (50) by a beam splitter (24) upon which the reflected light passed through the collimator becomes incident.

5. (Original) An optical pickup apparatus according to claim 4, wherein the reflected light incident upon each photodetector is visually confirmed by detecting means (CCD).

6. (Original) An optical pickup apparatus according to claim 5, wherein said detecting means is disposed on an opposite side of the beam splitter (24) relative to said focus adjusting means (50).

7. (Original) An optical pickup apparatus according to claim 1, wherein said focus adjusting means is made movable between the beam splitter and said photodetectors.

8. (Original) An optical pickup apparatus according to claim 7, wherein said focus adjusting means is moved by being slid on said chassis.

9. (Original) An optical pickup apparatus according to claim 7, wherein a distance (y) between a plane (68) on which said photodetectors are disposed and said focus adjusting means and a distance (x) between the plane and the beam splitter are maintained to have a predetermined relation ($y = ax + b$ where a and b are constants), and said focus adjusting means is made movable between the beam splitter and said photodetectors.

10.-15. (Canceled)

16. (Currently Amended) An optical pickup apparatus which serves to focus the spots (M, E, F, G, H, I and J) of a plurality of light beams on a plurality of tracks of a recording medium (34) to simultaneously read a plurality of pieces of data recorded on said tracks, said apparatus comprising:

(a) objective spot forming means (30) for forming each spot (M, E, F, G, H, I, and J) of [[a]] said plurality of light beams entered via a collimator (28), on each track of [[a]] said recording medium (34);

(b) a series of adjacent photodetectors (52M, 52E, 52F, 52G, 52H, 52I, and 52J) each provided for each spot (M to J) for receiving reflected light of each spot (M to J), the reflected light having passed through said objective spot forming means (30), said collimator (28), and focus adjusting means (50) in this order;

(c) a chassis (70) mounted with said collimator (28); and

(d) means (72, 78) for adjusting a distance between said focus adjusting means and said photodetectors,

wherein said adjusting means includes a first member (72) for supporting said focus adjusting means and a second member (78) for supporting said photodetectors, the first member (72) and the second member (78) being movable along a direction of an optical axis (66) and fixed to said chassis (70), and the distance is adjusted by moving the first member along said second member.

17. (Canceled)

18. (Currently Amended) An optical pickup apparatus which serves to focus the spots (M, E, F, G, H, I and J) of a plurality of light beams on a plurality of tracks of a recording medium (128) to simultaneously read a plurality of pieces of data recorded on said tracks, said apparatus comprising:

(a) a light reflection optical element (118, 1120, 1122, 1124, 1126) for reflecting [[a]] said plurality of light beams incoming along a direction of a first axial line (120), toward a direction of a second axial line (122) different from the first axial line, said light reflection optical element being attached rotatably around each of the first and second axial lines (120, 122);

(b) spot forming means (126) for forming a plurality of spatially separated spots (M, E, F, G, H, I, and J) of each light beam incoming along the direction of the second axial line (122) from said light reflection optical element (118, 1120, 1122, 1124, 1126), on each track (142) of [[a]] said recording medium (128);

(c) support means (170, 182) for rotatably supporting said light reflection optical element (118, 1120, 1122, 1124, 1126) about at least one rotation axial line on a chassis (180), the rotation axial line passing a reference point (138) which is a cross point between the first and second axial lines (120, 122);

(d) fixing means (198, 1102) for fixing said light reflection optical element (118, 1120, 1122, 1124, 1126) to the chassis (180), whose rotational position has been adjusted so that the focus states of said plurality of spots (M, E, F, G, H, I, and J) are substantially equal; and

(e) reflected light detecting means (134) for detecting reflected light of each spot (M to J) passed through said spot forming means (126).

19. (Original) An optical pickup apparatus according to claim 18, wherein the rotation axial line includes a rotation axial line perpendicular to both the first axial line (120) and the second axial line (122).

20. (Original) An optical pickup apparatus according to claim 18, wherein the rotation axial line includes a rotation axial line coincident with the first axial line (120).

21. (Original) An optical pickup apparatus according to claim 18, wherein the rotation axial line includes a rotation axial line coincident with the second axial line (122).

22. (Original) An optical pickup apparatus according to claim 18, wherein said support means (170, 192) includes a spherical fitting portion (170, 192).

23. (Original) An optical pickup apparatus according to claim 18, wherein said light reflection optical element is a triangular prism (118).

24. (Withdrawn) An optical pickup apparatus according to claim 23, wherein said light reflection optical element is an inner surface reflection type triangular prism (1120), and the light beam is reflected by a reflection surface (140).

25. (Withdrawn) An optical pickup apparatus according to claim 18, wherein said light reflection optical element is a semispheric mirror (1122).

26. (Withdrawn) An optical pickup apparatus according to claim 18, wherein said light reflection optical element is a circular disc mirror (1124).

27. (Original) An optical pickup apparatus according to claim 18, wherein said support means includes a concave spherical portion (170) and a convex spherical portion (192) which can be spherically fitted together.

28. (Original) An optical pickup apparatus according to claim 27, wherein said light reflection optical element is held by holding means (160) partially constituting said support means, said fixing means is a screw (198), said holding means is fixed to the chassis by the screw via a washer, and a height of the washer is changed with a threading amount of the screw to thereby tightly fit together the concave spherical portion and the convex spherical portion.

29. (Original) An optical pickup apparatus according to claim 18, wherein said light reflection optical element is held by holding means (160) partially constituting said support means, said fixing means is a screw (198), said holding means is fixed to the chassis by the screw, a screw hole of the chassis has a diameter larger than a diameter of a shaft of the screw, and said light reflection optical element can be displaced along the chassis by an amount corresponding to a difference between the diameters.

30. (Currently Amended) An optical pickup apparatus which serves to focus the spots (M, E, F, G, H, I and J) of a plurality of light beams on a plurality of tracks of a recording medium (128) to simultaneously read a plurality of pieces of data recorded on said tracks, said apparatus comprising:

(a) a light reflection optical element (118, 1120, 1122, 1124, 1126) for reflecting [[a]] said plurality of light beams incoming along a direction of a first axial line (120), toward a direction of a second axial line (122) different from the first axial line, said light reflection optical element being attached rotatably around each of the first and second axial lines (120, 122);

(b) spot forming means (126) for forming a plurality of spatially separated spots (M, E, F, G, H, I, and J) of each light beam incoming along the direction of the second axial line (122) from said light reflection optical element (118, 1120, 1122, 1124, 1126), on each track (142) of [[a]] said recording medium (128);

(c) support means (1110) for movably supporting said light reflection optical element (118, 1120, 1122, 1124, 1126) on the chassis along the direction of the first axial line (120) and/or the direction of the second axial line (122);

(d) fixing means (198, 1102) for fixing said light reflection optical element (118, 1120, 1122, 1124, 1126) to the chassis (180), whose positions to the directions of said first and second axial lines (120, 122) have been adjusted so that the focus states of said plurality of spots (M, E, F, G, H, I, and J) are substantially equal; and

(e) reflected light detecting means (134) for detecting reflected light of each spot (M to J) passed through said spot forming means (126).

31. (Original) An optical pickup apparatus according to claim 27, wherein said light reflection optical element is held via a mount member (172) by holding means (160a) partially constituting said support means, said mount member is fixed to said holding means by a screw (1114) via a washer (1112), a height of the washer is changed with a threading amount of the screw to thereby moving up and down said light reflection optical element.

32. (Original) An optical pickup apparatus according to claim 31, wherein said support means (110) regulate said mount member from being rotated during threading the screw, in a direction of threading the screw.

33.-52. (Canceled)